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AS0302 July 12, 1999

Bonita Lavelle
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U.S. EPA, Region 8
999 - 18th Street, Suite 500
Mail Code 8EPR-SR
Denver, CO 80202

Re: Draft Project Plan - Phase III Field Investigation
Vasquez Boulevard / Interstate 70 Site (VB/I70)
June 30, 1999

Dear Ms. Lavelle:

This letter provides comments, submitted on behalf of ASARCO Incorporated, on the document referenced above and received on July 2, 1999.

GENERAL STUDY OBJECTIVE

We understand the purpose of the draft project plan is to provide site specific data to adequately characterize the nature and extent of environmental contamination within residential areas of the VB/I70 site and support reliable risk assessment calculations and risk management decisions for these areas.

GENERAL CONCERNS

The draft plan appears to be adequate to conduct a conservative risk assessment. However, several aspects of the project plan warrant further consideration. Asarco's general concerns are outlined as follows:

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- Because the Phase III Field Investigation is designed to address risk it does not provide sufficient data to design cost effective cleanup (i.e., limiting remediation to those areas above the risk based concentrations). Similarly, the Phase III Field Investigation will not provide sufficient data to address sources of contamination. Therefore, it is imperative that additional sampling be conducted subsequent to the Phase III Field Investigation to address these issues.

- Two previous studies at this site (USEPA 1997 and 1998) have demonstrated that the analytical methodology proposed for this investigation (XRF) is biased high especially at low concentration levels for arsenic. This bias should be eliminated or another analytical method should be used.

- When the mean value or the 95% upper confidence limit of the mean (95% UCL) is used as the basis of comparison with a risk based concentration, the magnitude of each value is important. The proposed detection limit for arsenic of 20 mg/kg may, depending on how values below detection are handled, raise the mean concentration values and 95% UCL values. Therefore, a lower detection limit is desirable for arsenic. It should be noted that the statistical simulations presented in the draft project plan are based on data having lower detection limits for arsenic than is proposed for the Phase III Field Investigation.

- The statistical simulations presented in the draft project plan appear to assume that compositing results in complete mixing. That is, a sample from each composite sample is assumed to be equivalent to (i.e., have the same analytical value) as the arithmetic average of many soil samples from the same composite sample. However, because of the heterogeneity of soil and the probability that mixing will be less than complete, it is unlikely that a single sample from a composite will equal the arithmetic mean that would result from testing of the individual discrete samples comprising the composite sample. If mixing of the composite samples is less than complete the variability will be larger than would be expected based on the statistical simulations presented in the draft project plan and, therefore, the actual calculated 95 percent upper confidence limit (95% UCL) values will be greater than expected from the statistical simulations. Because the proposed sampling plan depends on the assumption that a composite sample is the same as the arithmetic average of individual sample values, it is critical that an evaluation of the expected variance within composite samples be undertaken to evaluate the effectiveness of compositing. This evaluation could be conducted by collecting and preparing several composite samples and then taking and analyzing discrete samples from each composite sample.

- The collection of ten 3-inch diameter samples over the 0-inch to 2-inch depth interval will result in a sample containing approximately 3.3 kilograms (7.3 pounds) of soil and a volume of approximately 2.2 liters (0.58 gallons). Such a large volume of soil will be

difficult to thoroughly mix and may defeat the purpose of compositing. Therefore, to promote more thorough mixing, minimize the direct impacts of sampling and minimize the volume of samples to be managed, it is suggested that 1-inch diameter samples be collected over the 0- to 2-inch depth interval at each discrete sample location. This will result in each 10-point composite sample containing approximately 0.25 liter of soil and weighing approximately 292 ± grams. For comparison, an XRF sample cup is expected to contain approximately 10- to 15-grams of soil and each analysis by ICP is expected to consume approximately 1- to 2-grams of soil. Further, the collection of three 10-point composite samples from each of the approximately 3,000 residential properties to be sampled as part of the Phase III Field Investigation using 3-inch diameter cores would result in the collection of approximately 65,700 lbs of soil sample. For comparison, the collection of three 10-point composite samples using 1-inch diameter cores would result in the collection of approximately 7,300 lbs of soil sample.

- Because the probability of a erroneously declaring a contaminated property clean (Type II error) has been set at 0.05, the draft Phase III Field Investigation should, by definition, limit the risk of erroneously declaring a contaminated property clean (Type II error) to 5% or less. However, because of incomplete mixing, high detection limits, and the possibility of a lower risk based concentration than assumed in the statistical simulations, the proposed plan may not adequately control the risk of erroneously declaring a clean property contaminated (Type I error). Therefore, additional sampling to control Type I errors should be conducted, as economically warranted, at properties identified by the Phase III Field Investigation as being above the risk based concentrations.

- Because the samplable area varies from residential property to residential property, while the number of grab samples and composite samples per residential property remains constant, the sampling density (number of samples per square foot of area) is higher for small properties than for larger properties, which could bias the results.

Asarco's specific comments on the Draft Project Plan are presented below. Suggested new language is indicated in bold text, suggested omissions are shown by strike-outs, and explanatory comments are in italics.

SPECIFIC COMMENTS

Page 1-2 - "Contained within the site boundary are two historic smelters (Omaha-Grant and Argo) ~~and one current smelter (Globe)~~." **One current smelter is located north and west of the site (Globe).**

"As sampling activities were extended further from the smelter a number of residential properties with ~~elevated~~ **higher than anticipated** levels of metals on soil were identified" *As currently*

written the text implies that smelter emissions are the source of the elevated metals concentrations which has not been demonstrated.

Pages 2-3,4 - "However, the use of the 95% UCL for arsenic means that some properties that are actually safe may be declared to be unacceptable. Generally, the frequency of this type of error should be no more than 20% (USEPA 1992b). For this project, the goal is to ensure that the frequency of this type of error is as low as can be achieved with the available sampling and analysis budget." **Once properties that are potentially unacceptable are identified, USEPA may choose to collect additional surface soil samples to minimize this type of error.**

Page 2-5 - "Because the distributions are not well characterized as either normal or lognormal, use of either equation 1 or equation 2 as the basis for calculati~~on~~**ing** the 95% UCL based on a series of grab samples might yield results that are not accurate."

"This is because, regardless of the shape of the parent distribution, the distribution of the values of composite samples will approach a normal distribution if the number of samples is sufficiently large **and the sub-samples forming the composite samples are thoroughly mixed**, allowing the use of equation 1 for calculation of the UCL of the mean at a property."

Page 2-6 - Number of Samples per Composite
The Monte Carlo simulations performed to estimate the number of sub-samples per composite used data from the VB/I70 Phase II Risk-Based Sampling. This data was the product of ICP analysis that had a detection level of approximately 9 mg/kg for arsenic in contrast with the proposed minimum detection level for arsenic of 20 mg/kg for the Phase III study. The higher detection level proposed for the Phase III Field Investigation will result in different results and may result in different conclusions than supported by the statistical simulations.

"Thus, the distribution of the 10-point composite samples from such a property is likely to be somewhat right skewed. **For right skewed distributions the median is less than the mean and therefore a single 10-point composite sample is more likely to be below the true mean than it is above the true mean** and the use of equation 1 to calculate the 95% UCL could underestimate the true UCL." **However, some 10-point composite sample values may be raised by very high, although infrequent values and the mean of the three 10-point composite samples should therefore approach the true mean."**

Page 2-8 - *The statistical simulation predicting a Type I (false positive) error rate on the order of 4% is not surprising because the simulation appears to be based on a data set that was censored to consist of values less than or equal to 70 mg/kg. Under these circumstances, it is not surprising that only 4% of the simulated values were above the assumed risk based concentration of 70 mg/kg. Because of the heterogeneity of soil and because mixing of the composites will be less than thorough, it is unrealistic to expect the Type I (false positive) error*

to be limited to 4%. Therefore, it is critical that a study of the variability within composite samples should be undertaken to evaluate the effectiveness of the mixing process. Alternatively, additional sampling to reduce Type I errors should be undertaken at properties where the 95% UCL value exceed the risk based concentration.

Page 2-9 - Analytical Method and Detection Limits - *An observed bias towards high values (as compared to ICP) has been identified in at least two previous studies associated with the VB/I70 site. The relatively high detection limits for arsenic and lead will increase the average soil metals concentration values and the 95% UCL values, particularly for arsenic.*

Page 2-10 - Data Interpretation/Data Use - *A discussion of the options and proposed procedure for handling analytical values below detection should be included in the project plan.* **Values below detection will be taken as half the sample quantitation level.**

Page 2-11 - *We expect that ground cover (e.g., sod versus bare dirt) will affect the correlation between indoor dust and soil metals concentrations.*

Page 2-12 - Sample Collection - "One composite dust sample consisting of 8-14 sub-samples will be collected at each residence." *The dust collection SOP appears to indicate that one dust collection sample is to be obtained from each residence, whereas the Project Plan for the Phase III Field Investigation appears to indicate that dust samples will be collected from between 60 to 90 homes.*

Page 2-13 - Data Interpretation /Data Use - *How will the background concentration, Do, of arsenic or lead in dust be determined? The contribution of paint chips to arsenic and lead levels must be adequately addressed in the study area homes, most of which were constructed prior to 1940.*

Page 2- 18 - Number and Location of Sample Location - **To assure data comparability, the sampling plan for schools and parks will provide approximately the same sample density as for residential properties (e.g., 18 to 20 composite samples for every acre of area that can be sampled).**

Page 2-19 - Table 2-1 List of Schools and Parks - *We note that soils at Garden Place School were sampled by Denver Public Schools in 1989, who replaced the soils despite low levels of the contaminants of potential concern. The property was re-sampled by Asarco under the Globe Plant Consent Decree program; these latter data have already been provided to EPA.*

Page 3-7 - Preparation of Bulk Samples - "From this bag, a 10-g sample is removed and placed in a new zip lock bag, labeled with the sample ID (suffix = R) and forwarded to the XRF analyst for testing." **The effectiveness of mixing will be evaluated by removing ten, 10 gram samples,**

analyzing the resulting ten samples for the constituents of concern, and evaluating the variability of the analytical results.

Page 3-8 - Preparation of Fine Samples - *Because of the heterogeneity of soil and because mixing of composite samples will be less than thorough, the correlation between bulk and fine sample analytical results may be less than expected, resulting in greater variability than might be otherwise expected.*

Page 3-9 - Indoor Dust Samples - *Because lead paint can contribute greatly to indoor dust samples of lead, the investigators should note the age of the house, sample of the lead content of the paint (if possible), and make note of the condition of the paint. This information will help when trying to interpret the correlation between lead in outdoor soil and indoor dust.*

Page 3-15 - Soil Sampling - "Each sample will be collected using a clean coring tool (~~3-inch~~ **1-inch** diameter)(Appendix E).

Because a relatively large number of samples will be collected at each residential property (thirty 1-inch diameter samples per residential property), the resulting sample holes or depressions will be backfilled with a USEPA approved topsoil mixture.

Page 3-16 - Preparation of Bulk Samples - "From this bag, a 10-g sample is removed and placed in a new zip lock bag, labeled with the sample ID (suffix = R) and forwarded to the XRF analyst for testing." **The effectiveness of mixing will be evaluated by removing ten, 10 gram samples, analyzing the resulting ten samples for the constituents of concern, and evaluating the variability of the analytical results.**

Page 3-17 - Section 3.7.3 - Preparation of Fine Samples - *Section 3.7 addresses schools and parks, therefore, the reference to residences in this section should be revised to refer to schools and parks. How many schools and parks will fine sampling be conducted at? Because of the heterogeneity of soil and limited mixing the correlation between bulk and fine sample analytical results may be less than expected.*

Figure 3-3 of Draft Project Plan for the VB/I70 site, Phase III Investigation (a.k.a. Figure 2 of Appendix E - Standard Operating Procedures) Proposed Grid Sampling Design for Residential Surface Soil shows 9 yellow sample locations, 11 red sample locations, and 10 blue sample locations. This figure should be modified to show 10 yellow sample locations, 10 red sample locations, and 10 blue sample locations.

The discrete sub-sample locations within each sub-section should be randomly distributed as opposed to being preferentially placed at the discretion of the samplers.

The sample subsections include areas adjacent to buildings, roof downspouts and other features that may, depending upon site specific circumstances, contribute significantly toward elevated metals concentrations due to metals from paint pigments and construction materials such as terne metal and lead flashing.

Attachment B - *Table 1 of Attachment B suggests that the interference free detection limit for arsenic in quartz sand is on the order of 40 mg/kg compared to the proposed detection limit for the Phase III Field Investigation of 20 mg/kg.*

Thank you for the opportunity to comment on the Draft Project Plan for the Phase III Field Investigation at the VB/I70 Site. Please call if you have any questions.

Sincerely,
EnviroGroup Limited

David J. Folkes, P.E.
Principal

cc: Bob Litle - Asarco
Linda Larsen, Esquire
Joyce Tsuji, PhD - Exponent